

WHAT IS CLAIMED IS:

1. A method for charging toner particles prior to being delivered to a development delivery device, comprising  
entraining the toner particles in an airborne stream; and  
subjecting the airborne stream of toner particles to unipolar gas ions at an ion charging zone where an applied alternating electric field is present.

2. The method according to claim 1, wherein the subjecting includes uniformly charging irregular or spherical shaped toner particles in the airborne stream to a Pauthenier charging limit.

3. The method according to claim 2, wherein the subjecting includes:  
charging the airborne stream of toner particles with a first charging device; and  
re-charging the airborne stream of toner particles with a second charging device.

4. The method according to claim 3, wherein the entraining includes transporting the airborne stream of toner particles to the ion-charging zone between the first charging device and the second charging device.

5. The method according to claim 3, wherein the charging includes applying a first AC voltage bias to the first charging device.

6. The method according to claim 3, wherein the re-charging includes applying a second AC voltage bias to the second charging device.

7. The method according to claim 5, wherein the re-charging includes applying a second AC voltage bias to the second charging device which is 180 degrees out of phase from the first AC voltage.

8. The method according to claim 7, wherein the power source to supply the first AC voltage and the second AC voltage is provided by a power supply source connected to a sine or square-wave generator.

9. The method according to claim 1, further comprising collecting the charged toner particles in a collection area to be subsequently delivered to the development delivery device.

10. The method according to claim 3, wherein the first charging device and the second device includes a scorotron.

11. A electrostatic printer employing a method for charging toner particles prior to being delivered to a development delivery device, comprising:  
entraining the toner particles in an airborne stream; and  
subjecting the airborne stream of toner particles to unipolar gas ions at an ion charging zone where an applied alternating electric field is present.

12. The method according to claim 11, wherein the subjecting includes uniformly charging irregular or spherical shaped toner particles in the airborne stream to a Pauthenier charging limit.

13. The method according to claim 12, wherein the subjecting includes:

charging the airborne stream of toner particles with a first charging device; and

re-charging the airborne stream of toner particles with a second charging device.

14. The method according to claim 13, wherein the entraining includes transporting the airborne stream of toner particles to the ion-charging zone between the first charging device and the second charging device.

15. The method according to claim 13, wherein the charging includes applying a first AC voltage bias to the first charging device.

16. The method according to claim 13, wherein the re-charging includes applying a second AC voltage bias to the second charging device.

17. The method according to claim 15, wherein the re-charging includes applying a second AC voltage bias to the second charging device which is 180 degrees out of phase from the first AC voltage.

18. The method according to claim 17, wherein the power source to supply the first AC voltage and the second AC voltage is provided by a power supply source connected to a sine or square-wave generator.

19. The method according to claim 11, further comprising collecting the charged toner particles in a collection area to be subsequently delivered to the development delivery device.

20. The method according to claim 13, wherein the first charging device and the second device includes a scorotron.